I made the R (Sweave) code available in http://www.stat.wisc.edu/~gvludwig/spring_2013/extra11.Rnw

Remember R is not a part of the course syllabus; I’ll explain some of the code objectives but don’t worry too much. Unless you want to learn R, in which case we can talk after class!

**Exercise 11.2.23**

This plot is illustrative of the model, but remember each of the cells in the given table contains the total compressive strength of that level, not the data itself.

```r
> cap1 <- c(1847, 1942, 1935, 1891, 1795)
> cap2 <- c(1779, 1850, 1795, 1785, 1626)
> cap3 <- c(1806, 1892, 1889, 1891, 1756)
> ylim <- c(min(c(cap1,cap2,cap3)), max(c(cap1,cap2,cap3)))
> plot(1:5, cap1, xlim=c(1,6), ylim=ylim, type="b",
+     xlab="Batch", ylab="Strength",
+     main="Compressive Strength (11.2.23)"
> lines(1:5, cap2, type="b", lty=2)
> lines(1:5, cap3, type="b", lty=3)
> text(5, cap1[5], pos=4, "Material 1")
> text(5, cap2[5], pos=4, "Material 2")
> text(5, cap3[5], pos=4, "Material 3")
```
Exercise 11.3.34

```r
> Store <- factor(rep(1:6, 6))
> Week <- factor(c(rep(1, 6), rep(2, 6), rep(3, 6),
+ rep(4, 6), rep(5, 6), rep(6, 6)))
> Shelf <- factor(c(5, 6, 2, 3, 4, 1, 4, 5, 6, 1, 3, 2, 3, 4, 5, 2, 1, 6,
+ 1, 3, 4, 6, 2, 5, 6, 2, 1, 4, 5, 3, 2, 1, 3, 5, 6, 4))
> Sales <- c(27, 34, 39, 40, 15, 16, 14, 31, 67, 57, 15, 15,
+ 18, 34, 31, 39, 11, 14, 35, 46, 49, 70, 9, 12,
+ 28, 37, 38, 37, 18, 19, 22, 23, 48, 50, 17, 22)
> # You can look at the data by calling each variable
> # name; I used the "cbind" (short for column-bind)
> # function to display it in a matrix form. Notice that
> # this is the way you want to input this data in R,
> # Excel, JMP and other statistical softwares too
> # (e.g. Minitab, SAS, SPSS) or MATLAB.
> #
> # The Latin Square visualization is only helpful
> # to summarize the data.
>>
> cbind(Store, Week, Shelf, Sales)

Store Week Shelf Sales
```

2
```r
> # Show the means per group
> 
> round(tapply(Sales, Store, mean), 2)

1 2 3 4 5 6
24.00 34.17 45.33 48.83 14.17 16.33

> round(tapply(Sales, Week, mean), 2)

1 2 3 4 5 6
28.50 33.17 24.50 36.83 29.50 30.33
```
> round(tapply(Sales, Shelf, mean), 2)

   1   2 3   4 5   6
30.00 26.83 31.00 28.50 28.17 38.33

> # R can, in fact, calculate the entire ANOVA table for you! I am
> # sure JMP also does calculate it for you.
>
> options(useFancyQuotes = FALSE)
> model <- lm(Sales ~ Store + Week + Shelf)
> anova(model)

Analysis of Variance Table

Response: Sales

             Df Sum Sq Mean Sq F value Pr(>F)
Store         5 6475.8 1295.16 20.2809 3.274e-07 ***
Week          5  529.5 105.89  1.6582 0.1908
Shelf         5  508.5 101.69  1.5924 0.2078
Residuals    20 1277.2  63.86        
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1